

AMENDMENTS TO THE CLAIMS

The listing of claims replaces all prior versions, and listings, of claims in the application:

Listing of Claims

1. (Currently amended) An apparatus for use in controlling the temperature of one or more substances passing through one or more microfluidics channels in an analysis device, the apparatus comprising:

a heating unit having opposed first and second surfaces, said first surface of said heating unit being at least partially exposed for cooling of said heating unit such that said first surface includes an exposed portion that does not contact another solid surface;

a thermally conductive medium disposed proximate the second surface of said heating unit, said one or more micro fluidics channels being disposed in said thermally conductive medium.

2. (Original) An apparatus as claimed in claim 1 wherein said thermally conductive medium is comprised of at least one layer of a thermally conductive rubber material.

3. (Original) An apparatus as claimed in claim 1 wherein the one or more of microfluidics channels are comprised of a plurality of capillary columns.

4. (Original) An apparatus as claimed in claim 3 and further comprising a heat dissipating unit contacting said thermally conductive medium opposite said heating unit.

5. (Original) An apparatus as claimed in claim 4 wherein said heat dissipating unit comprises a Peltier cooler.

6. (Original) An apparatus as claimed in claim 4 wherein said heat dissipating unit comprises a metal layer having a first side proximate said thermally conductive medium and a second side that is at least partially exposed for cooling of said metal layer.

7. (Original) An apparatus as claimed in claim 6 wherein the second side of said metal layer is exposed to the ambient atmosphere for cooling of said metal layer.

8. (Original) An apparatus as claimed in claim 3 wherein said first and second surfaces of said heating unit are generally parallel with and disposed opposite one another.

9. (Original) An apparatus as claimed in claim 3 wherein said first and second surfaces of said heating unit are generally coplanar.

10. (Original) An apparatus as claimed in claim 3 wherein said heating unit

comprises:

a thin-film, electrical heating element having first and second opposed sides, said first opposed side of said thin-film, electrical heating element forming said first surface of said heating unit;

a metal layer disposed over at least a portion of the second opposed side of said thin-film, electrical heating element to conduct thermal energy between said thin-film, electrical heating element and said thermally conductive medium.

11. (Original) An apparatus as claimed in claim 3 wherein said thermally conductive medium is readily separated from said heating unit without damage to said heating unit.

12. (Original) An apparatus as claimed in claim 11 wherein said heating unit and said thermally conductive medium are secured with one another using one or more fasteners.

13. (Cancelled)

14. (Cancelled)

15. (Original) An apparatus as claimed in claim 11 wherein said thermally conductive medium is secured with said heating unit using an adhesive.

16. (Original) An apparatus as claimed in claim 11 wherein said thermally conductive medium is comprised of a thermally conductive silicone gel material.

17. (Original) An apparatus as claimed in claim 10 wherein said thermally conductive medium is disposed on said metal layer and is readily separated from said metal layer without damage to said heating unit.

18. (Original) An apparatus as claimed in claim 17 wherein said thermally conductive medium is comprised of a thermally conductive silicone gel material.

19. (Original) An apparatus as claimed in claim 18 and further comprising a heat dissipating unit contacting said thermally conductive medium opposite said heating unit.

20. (Original) An apparatus as claimed in claim 19 wherein said heat dissipating unit comprises a Peltier cooler.

21. (Original) An apparatus as claimed in claim 19 wherein said heat dissipating unit comprises a metal layer having a first side proximate said thermally conductive medium and a second side that is at least partially exposed for cooling of said metal layer.

22. (Original) An apparatus as claimed in claim 21 wherein the second side of

said metal layer is exposed to the ambient atmosphere for cooling of said metal layer.

23. (Original) An apparatus as claimed in claim 3 wherein said first surface of said heating unit is exposed to ambient atmospheric conditions.

24. (Cancelled)

25. (Cancelled)

26. (Cancelled)

27. (Cancelled)

28. (Cancelled)

29. (Cancelled)

30. (Cancelled)

31. (Cancelled)

32. (Cancelled)

33. (Cancelled)

34. (Cancelled)

35. (Cancelled)

36. (Cancelled)

37. (Original) An apparatus for executing a capillary electrophoresis process comprising:

a first electrode unit adapted to receive one or more substances for electrophoretic analysis;

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a second electrode unit;

a plurality of capillaries extending between said first and second electrode units and adapted to conduct said one or more substances therethrough;

a detection chamber disposed between the first and second electrode units and along said plurality of capillaries to detect one or more characteristics of said one or more substances passing through said plurality of capillaries;

a temperature control unit disposed between said first electrode unit and said detection chamber along said plurality of capillaries, said temperature control unit being adapted to control the temperature of said one or more substances passing through said plurality of capillaries, said temperature control unit including,

a heating unit having first and second surfaces, said first surface of said heating unit being at least partially exposed for cooling of said heating unit,

a thermally conductive medium disposed proximate the second surface of said heating unit, said plurality of capillaries being disposed in said thermally conductive medium, and

one or more temperature sensors disposed to detect the temperature at one or more sites of the temperature control unit;

a thermal controller programmed to execute a capillary electrophoresis process in which the energy provided to heat and/or cool the temperature control unit is varied at least in response to said one or more temperature sensors.

38. (Original) An apparatus as claimed in claim 37 wherein said thermally conductive medium is comprised of at least one layer of a thermally conductive rubber

material.

39. (Original) An apparatus as claimed in claim 37 and further comprising a heat dissipating unit contacting said thermally conductive medium opposite said heating unit.

40. (Original) An apparatus as claimed in claim 39 wherein said heat dissipating unit comprises a Peltier cooler.

41. (Original) An apparatus as claimed in claim 39 wherein said heat dissipating unit comprises a metal layer having a first side proximate said thermally conductive medium and a second side that is at least partially exposed for cooling of said metal layer.

42. (Original) An apparatus as claimed in claim 41 wherein the second side of said metal layer is exposed to the ambient atmosphere for cooling of said metal layer.

43. (Original) An apparatus as claimed in claim 37 wherein said first and second surfaces of said heating unit are generally parallel with and disposed opposite one another.

44. (Original) An apparatus as claimed in claim 37 wherein said first and second surfaces of said heating unit are generally coplanar.

45. (Original) An apparatus as claimed in claim 37 wherein said heating unit comprises:

a thin-film, electrical heating element having first and second opposed sides, said first opposed side of said thin-film, electrical heating element forming said first surface of said heating unit;

a metal layer disposed over at least a portion of the second opposed side of said thin-film, electrical heating element to conduct thermal energy between said thin-film, electrical heating element and said thermally conductive medium.

46. (Original) An apparatus as claimed in claim 37 wherein said thermally conductive medium is readily separated from said heating unit without damage to said heating unit.

47. (Cancelled)

48. (Original) An apparatus as claimed in claim 46 wherein said thermally conductive medium is secured with said heating unit using an adhesive.

49. (Original) An apparatus as claimed in claim 46 wherein said thermally conductive medium is secured with said heating unit using a mechanical fastener.

50. (Original) An apparatus as claimed in claim 46 wherein said thermally

conductive medium is comprised of a thermally conductive silicone material.

51. (Original) An apparatus as claimed in claim 45 wherein said thermally conductive medium is disposed on said metal layer and is readily separated from said metal layer without damage to said heating unit.

52. (Original) An apparatus as claimed in claim 51 wherein said thermally conductive medium is comprised of a thermally conductive silicone material.

53. (Original) An apparatus as claimed in claim 37 wherein said first surface of said heating unit is exposed to ambient atmospheric conditions.

54. (Currently amended) An apparatus for use in controlling the temperature of one or more substances passing through one or more microfluidics channels in an analysis device, the apparatus comprising:

a planar shaped heating unit having first and second opposing surfaces, said first surface of said heating unit being at least partially exposed for cooling of said heating unit such that said first surface includes an exposed portion in contact with a liquid or a gas;

a thermally conductive medium disposed proximate the second surface of said heating unit, said one or more microfluidics channels being disposed in said thermally conductive medium.

55. (Previously Presented) An apparatus as claimed in claim 54 wherein the one or more microfluidics channels comprise a capillary column.

56. (Currently amended) The apparatus as claimed in claim 54 wherein the exposed portion of said first and second surfaces are opposing surfaces surface of said heating unit is in contact with a flow of liquid or gas.

57. (Currently amended) The apparatus of claim 56-54 wherein the first and second opposing surfaces each have a substantially greater surface area than any other surface of the planar shaped heating unit.

58. (Previously presented) The apparatus of claim 57 wherein the planar shaped heating unit is formed as a multilayer composite.

59. (Previously presented) The apparatus of claim 58 wherein the planar shaped heating unit comprises a heating element and an intermediate conductive or convective layer, wherein the intermediate conductive or convective layer is disposed between the heating element and the thermally conductive medium.

60. (Previously presented) The apparatus of claim 54 wherein said thermally conductive medium comprises a first portion disposed proximate a thermally conductive plate, and a second portion disposed proximate the second surface of said heating unit.

61. (Previously presented) The apparatus of claim 60 further comprising a hinge structure connecting said thermally conductive plate and said heating unit for relative rotational movement about a hinge axis.

62. (Previously presented) The apparatus of claim 61 wherein said heating unit and said thermally conductive plate are configured to rotate about said hinge axis between an operative position in which said one or more microfluidics channels are secured between and in substantial thermal contact with said first portion of thermally conductive material and said second portion of thermally conductive material, and an inoperative position in which said first portion of thermally conductive material is separated from said second portion of thermally conductive material.